



UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

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MISSION ANALYSIS AND
SYSTEMS ACQUISITION DIVISION

B-207165

APRIL 28, 1982

RELEASED



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The Honorable William Proxmire
Ranking Minority Member
Committee on Appropriations
United States Senate

Dear Senator Proxmire:

Subject: Analysis of NASA's Fiscal Year 1983 Budget Request
for Research and Development to Determine the
Amount That Supports DOD's Programs (MASAD-82-33)

In February 1982, the Administrator of the National Aeronautics and Space Administration (NASA), in testimony before the Congress in support of the fiscal year 1983 budget, stated:

"* * * The national security related space program and the commercial programs have both seen very substantial increases in the past five years. These increases are related to important national security requirements as well as new commercial opportunities. * * *

"In accord with the Administration's policies, NASA's FY 1983 program shows the retention of, or increases in, those programs that can be related directly to national security. We have also maintained a strong program in those fields directly related to the responsibilities of NASA under the National Aeronautics and Space Act. However, some programs have been reduced or delayed because of the urgent need to reduce federal spending.
* * *

The Congress is concerned that NASA may not be maintaining a proper balance between civil and military activities, which could lead to the militarization of NASA.

According to your request of February 22, 1982, and subsequent discussions with your office, we reviewed NASA's fiscal year 1983 budget request to identify those programs that support the Department of Defense (DOD). The allocation that NASA made for us showed less than 0.1 percent of its budget was for DOD support. Based on our review, we allocated NASA's research and development budget request for fiscal year 1983 as follows.

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<u>Program</u>	<u>DOD support</u>	<u>Civil support</u>	<u>Civil & DOD support</u>	<u>Total</u>
	------(millions)-----			
Space Transportation Systems	\$1,087.7	\$2,380.1	\$ -	\$3,467.8
Space Science & Applications	-	934.1	68.2	1,002.3
Aeronautics & Space Technology	4.8	13.3	336.9	355.0
Tracking & Data Acquisition	-	505.0	3.9	508.9
Total	<u>\$1,092.5</u>	<u>\$3,832.5</u>	<u>\$409.0</u>	<u>\$5,334.0</u>
Percent	<u>20.5</u>	<u>71.8</u>	<u>7.7</u>	<u>100.0</u>

Details for each program are shown in enclosure I.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our review was primarily directed toward NASA's research and development appropriation. Our review of the construction of facilities budget was limited to reviewing the budget justification backup book, and we did not find any indications that NASA facilities are being constructed to support DOD programs. As agreed, we did not examine the Research and Program Management appropriation.

At our request, NASA's program offices prepared a breakout of their fiscal year 1983 research and development appropriation budget request based on the following definitions which we provided as a guide to them. (See enc. II.)

- Direct support of DOD programs only: Work funded by NASA in its fiscal year 1983 budget request that would not be funded by NASA in fiscal year 1983 without a DOD requirement. If this work were not funded by NASA, DOD would most likely fund it.
- Direct support of civil programs only: This work has no application to DOD programs, and DOD's need is not considered in funding this work. Even if this work were not funded by NASA, DOD would not fund the work either.
- Direct support of both civil and DOD programs: The results of these programs benefit both civil and DOD programs and the funding cannot be allocated. If either the DOD or civil need were eliminated, the funding level would not change.

While NASA was preparing its analysis, we reviewed its budget backup books, selected fiscal year 1983 congressional testimonies, news articles, and studies to identify areas where NASA's efforts support DOD programs. We also reviewed backup documents at the program offices on a selected basis. We then discussed the data supplied by each program office with program officials as to the assumptions and basis used to make the allocations and ways to further allocate the fiscal year 1983 request that NASA listed as supporting both DOD and civil programs. NASA told us that allocating these costs between civil and DOD support is misleading because there is no precise basis to use.

SUPPORT OF DOD AND CIVIL PROGRAMS BY NASA

Based on the information NASA provided to us and the results of our review, we prepared an allocation of the 1983 budget which reflects changes to NASA's data that we believe are appropriate. (See enc. I.) A comparison of NASA's and our allocations follows.

<u>Allocation made by</u>	<u>DOD support</u>	<u>Civil support</u>	<u>Civil & DOD support</u>	<u>Total</u>
	------(percent)-----			
NASA	0.1	33.6	66.3	100
GAO	20.5	71.8	7.7	100

The differences shown above result from our allocating most of the costs that NASA placed under civil and DOD, to either DOD or civil. The remainder of the report explains the changes that we made to NASA's allocation.

Space Transportation System

NASA requested \$3,467.8 million in fiscal year 1983 for the Space Transportation System (STS). We allocated \$1,087.7 million of this to DOD programs and \$2,380.1 million to civil programs. (See enc. I.) The methods we used to allocate these costs and a description of the variances with NASA's allocations follows.

NASA officials said that neither their accounting system nor their system for estimating shuttle operations costs provide for a breakout of DOD related costs. NASA officials take the position that they have been given the task of developing STS as a national system. Therefore, reimbursements by DOD or any other U.S. Government agency for the purchase of orbiters or other equipment does not change the cost to the Government and NASA does not break out these costs by user. Also, NASA does not account for operations costs by individual flights, but on a yearly basis.

NASA allocated the \$3,467.8 as follows. No funds were allocated for DOD support.

<u>Program</u>	<u>Civil support</u>	<u>Civil & DOD support</u>	<u>Total</u>
	------(millions)-----		
Space Shuttle:			
Production	\$ -	\$1,585.5	\$1,585.5
Changes/systems upgrading	-	72.5	72.5
Performance augmentation	-	60.0	60.0
Space Flight Operations:			
STS operations capability development	32.5	52.9	85.4
Development, test, and mission support	-	82.4	82.4
Advanced programs	-	11.9	11.9
Spacelab	113.2	-	113.2
STS operations	97.5	1,316.6	1,414.1
Expendable Launch Vehicles	<u>42.8</u>	<u>-</u>	<u>42.8</u>
Total	<u>\$286.0</u>	<u>\$3,181.8</u>	<u>\$3,467.8</u>
<u>Civil support</u>			

We agree with NASA's allocation of \$286 million to the civil programs.

The \$32.5 million for STS operations capability development includes \$22.5 million to upgrade the mission control center at Johnson Space Center and is allocated to civil programs because DOD is reimbursing NASA for any additional requirements. The other \$10 million is to fund payload and operations support requirements for civil payloads.

The \$113.2 million is for Spacelab and there are no current requirements for DOD to use this facility.

The \$97.5 million for STS operations funds upper stages and provides unique payload support directly attributable to civil programs.

The \$42.8 million for Expendable Launch Vehicles funds NASA launches, including the Infrared Astronomy Satellite, Landsat-D1, and the Active Magnetospheric Particle Tracer Explorer.

Civil and DOD support

We disagree with NASA's allocation of the \$3,181.8 million to support civil and DOD programs. We allocated these costs to DOD and civil program support based on their planned use of the shuttle.

First, we allocated the cost of all those budget items except the \$1,316.6 million for STS operations. Based on NASA's latest traffic model, DOD is estimated to require 114 of the estimated 234 shuttle flights through 1994, or about 49 percent of the flights. When applied to the budget items totaling \$1,865.2 million, \$913.9 million would be allocated to DOD program support and \$951.3 million would be allocated to civil program support.

The \$1,316.6 million for STS operations must be allocated differently. This cost relates to 28 operational shuttle launches through fiscal year 1985--5 launches in 1983, 10 in 1984, and 13 in 1985. We first distributed the \$1,316.6 million among the 3-launch years. According to NASA, approximately 45 percent of the cost is for shuttle flights in 1983, 35 percent for shuttle flights in 1984, and 20 percent for shuttle flights in 1985. Using these percentages, we distributed the \$1,316.6 million budget for fiscal year 1983 among the 3-launch years--fiscal years 1983, 1984, and 1985.

<u>Year of launch</u>	<u>Total FY 1983 budget request</u>	<u>Amount that supports</u>	
		<u>DOD launches</u>	<u>Civil launches</u>
------(millions)-----			
1983	\$ 592.5	\$ -	\$ 592.5
1984	460.8	92.2	368.6
1985	<u>263.3</u>	<u>81.6</u>	<u>181.7</u>
Total	<u>\$1,316.6</u>	<u>\$173.8</u>	<u>\$1,142.8</u>

We then distributed the cost for each launch year to either DOD or civil. DOD has no launches in fiscal year 1983, 2 of the 10 flights in fiscal year 1984 (20 percent), and 4 of the 13 flights in 1985 (31 percent). Using these percentages, about \$92.2 million and \$81.6 million, for 1984 and 1985 launches, respectively, relates to DOD. The other \$1,142.8 million is for civil flights. These figures will vary slightly depending on estimated civil and DOD reimbursements.

We allocated the \$60 million for performance augmentation between DOD and civil programs on the basis that, in the long term, it benefits both. However, if we were looking at this request strictly in regard to fiscal year 1983, we would consider it as direct support of DOD programs. Augmentation of shuttle ascent performance is required to support a scheduled DOD west coast

launch in October 1985, even if other planned orbiter weight reduction measures and other system improvements are fully successful. The only identified payloads that need the performance augmentation (filament wound case) are DOD payloads.

Space Science and Applications

NASA requested \$1,002.3 million in fiscal year 1983 for Space Science and Applications. Our allocation of this amount to civil or DOD program support is shown in enclosure I.

We allocated \$55.7 million for life sciences as supporting both civil and DOD programs. NASA had allocated the entire amount to civil support. As stated in NASA's budget justification book for fiscal year 1983, the goals of the life sciences program are to provide a sound scientific, medical, and technical basis for safe and effective human space flight. This program is the key to developing a capability to sustain a permanent human presence in space. For these reasons, we believe life sciences should be shown as supporting both civil and DOD programs.

NASA's position is the life sciences are working toward a human presence in space and the type of uniform an individual wears makes no difference. However, NASA is also working to help make shuttle operations safer and easier for the crew. We believe that as a major shuttle user, the military will benefit from this program. Also, it would seem unreasonable to rule out a military interest in being able to sustain a permanent human presence in space. We agree with NASA's other Space Science and Applications allocations.

Aeronautics and Space Technology

NASA requested \$355 million in fiscal year 1983 for Aeronautics and Space Technology. Our allocation of this budget request is shown in enclosure I and agrees with NASA's allocation. However, based on recent NASA testimony, we were surprised that only \$4.8 million was in direct support of DOD programs.

The Associate Administrator for Aeronautics and Space Technology testified in February 1982 that the fiscal year 1983 research and technology base budget had been substantially reduced.

"* * * as a result of termination of systems technology programs focused primarily on commercial aviation needs in which it appears appropriate for the private sector to play a larger role. However, systems technology efforts for rotocraft and high-speed aircraft have been retained because of their importance to future military systems."

The aeronautics portion of the fiscal year 1983 budget includes \$182 million for the disciplinary research and technology base which consists of primarily long-term activities which are relatively basic and broadly applicable to all vehicle classes. This is high-risk, relatively fundamental work which is critical to the generation of a technology base for future aircraft--civil and military.

The remaining \$50 million in the fiscal year 1983 aeronautics budget is for systems technology programs. Program officials said that in most cases you cannot put a civil or military label on these efforts. In the long term the results will most likely be applicable to both.

We did examine several systems technology programs which appeared to be in direct support of military programs, but were listed as DOD and civil. For example, NASA's documented justification for the AFTI/F-111 Mission Adaptive Wing Program states that it is to provide low-risk technology which can be integrated into future military aircraft. The technology is required by the Air Force for consideration for future aircraft improvements. The program office officials told us that the objectives are to demonstrate the aerodynamic performance improvements of a smooth variable camber airfoil, and to develop a data base for using this technology in both civil and military aircraft. Other systems technology programs were similarly justified.

The Space Research and Technology budget request is \$120 million, of which \$117.7 million supports both civil and DOD programs, and the remaining \$2.3 million supports civil programs. The program officials said that the research is generic in nature and will be applicable to civil as well as military space programs. Based on our review of NASA's budget backup book and their program and specific objectives document which supports the budget justification, we do not have any reason to question their allocation.

Tracking and Data Acquisition

NASA has requested \$508.9 million in fiscal year 1983 for Tracking and Data Acquisition. We agree with NASA's allocation. The \$505 million allocated to civil programs reflects the current year's operating cost of NASA's three tracking networks. Because there are no DOD launches scheduled in fiscal year 1983, we believe NASA's allocation to civil launches is appropriate.

The \$3.9 million allocated to civil and DOD programs relates to the aerodynamics test range at Dryden Flight Research Facility where a variety of programs are done for civil and military aircraft.

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We did not request official comments on this report because of the need to issue the report in time for congressional consideration of the fiscal year 1983 budget request. We did, however, discuss a draft of the report with NASA officials and have incorporated these comments where appropriate.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

If we can be of further assistance, please let us know.

Sincerely yours,



W. H. Sheley, Jr.
Director

Enclosures - 2

GAO'S ALLOCATION OF NASA'S FY 1983BUDGET REQUEST FOR RESEARCH AND DEVELOPMENT

<u>Program</u>	<u>DOD support</u>	<u>Civil support</u>	<u>Civil & DOD support</u>	<u>Total</u>
	----- (millions) -----			
STS:				
Space Shuttle:				
Production	\$ 776.9	\$ 808.6	\$ -	\$1,585.5
Changes/systems upgrading	35.5	37.0	-	72.5
Performance augmentation	29.4	30.6	-	60.0
Total	<u>841.8</u>	<u>876.2</u>	<u>-</u>	<u>1,718.0</u>
Space Flight Operations:				
STS operations capability development	25.9	59.5	-	85.4
Development, test, and mission support	40.4	42.0	-	82.4
Advanced programs	5.8	6.1	-	11.9
Spacelab	-	113.2	-	113.2
STS operations	173.8	1,240.3	-	1,414.1
Total	<u>245.9</u>	<u>1,461.1</u>	<u>-</u>	<u>1,707.0</u>
Expendable Launch Vehicles	-	42.8	-	42.8
Total	<u>1,087.7</u>	<u>2,380.1</u>	<u>-</u>	<u>3,467.8</u>
Space Science and Applications:				
Physics and astronomy	-	460.5	11.2	471.7
Planetary exploration	-	154.6	-	154.6
Life sciences	-	-	55.7	55.7
Space applications	-	315.0	1.3	316.3
Technology utilization	-	4.0	-	4.0
Total	<u>-</u>	<u>934.1</u>	<u>68.2</u>	<u>1,002.3</u>
Aeronautics and Space Technology:				
Aeronautical Research and Tech:				
Research and technology base	2.4	8.0	171.6	182.0
Systems technology programs	2.4	-	47.6	50.0
Total	<u>4.8</u>	<u>8.0</u>	<u>219.2</u>	<u>232.0</u>
Space Research and Technology:				
Research and technology base	-	2.3	113.3	115.6
Systems technology programs	-	-	4.4	4.4
Total	<u>-</u>	<u>2.3</u>	<u>117.7</u>	<u>120.0</u>
Standards and Practices	-	3.0	-	3.0
Total	<u>4.8</u>	<u>13.3</u>	<u>336.9</u>	<u>355.0</u>
Tracking and Data Acquisition:				
Operations	-	335.9	2.3	338.2
Systems implementations	-	94.4	1.6	96.0
Advanced systems	-	13.4	-	13.4
TDRSS	-	61.3	-	61.3
Total	<u>-</u>	<u>505.0</u>	<u>3.9</u>	<u>508.9</u>
Total	<u>\$1,092.5</u>	<u>\$3,832.5</u>	<u>\$409.0</u>	<u>\$5,334.0</u>
Percent	<u>20.5</u>	<u>71.8</u>	<u>7.7</u>	<u>100.0</u>

NASA'S ALLOCATION OF ITS FY 1983

BUDGET REQUEST IN SUPPORT OF DOD. PROGRAMS

<u>Program</u>	<u>DOD support</u>	<u>Civil support</u>	<u>Civil & DOD support</u>	<u>Total</u>
	------(millions)-----			
STS:				
Space Shuttle:				
Production	\$ -	\$ -	\$1,585.5	\$1,585.5
Changes/system upgrading	-	-	72.5	72.5
Performance augmentation	-	-	60.0	60.0
Total	-	-	1,718.0	1,718.0
Space Flight Operations:				
STS operations capability development	-	32.5	52.9	85.4
Development, test, and mission support	-	-	82.4	82.4
Advanced programs	-	-	11.9	11.9
Spacelab	-	113.2	-	113.2
STS operations	-	97.5	1,316.6	1,414.1
Total	-	243.2	1,463.8	1,707.0
Expendable Launch Vehicles	-	42.8	-	42.8
Total	-	286.0	3,181.8	3,467.8
Space Science and Applications:				
Physics and astronomy	-	460.5	11.2	471.7
Planetary exploration	-	154.6	-	154.6
Life sciences	-	55.7	-	55.7
Space applications	-	315.0	1.3	316.3
Technology utilization	-	4.0	-	4.0
Total	-	989.8	12.5	1,002.3
Aeronautics and Space Technology:				
Aeronautical Research Tech:				
Research and technology base	2.4	8.0	171.6	182.0
Systems technology programs	2.4	-	47.6	50.0
Total	4.8	8.0	219.2	232.0
Space Research and Technology:				
Research and technology base	-	2.3	113.3	115.6
Systems technology programs	-	-	4.4	4.4
Total	-	2.3	117.7	120.0
Standards and Practices	-	3.0	-	3.0
Total	4.8	13.3	336.9	355.0
Tracking and Data Acquisition:				
Operations	-	335.9	2.3	338.2
Systems implementations	-	94.4	1.6	96.0
Advanced systems	-	13.4	-	13.4
TDRSS	-	61.3	-	61.3
Total	-	505.0	3.9	508.9
Total	<u>\$4.8</u>	<u>\$1,794.1</u>	<u>\$3,535.1</u>	<u>\$5,334.0</u>
Percent	<u>0.1</u>	<u>33.6</u>	<u>66.3</u>	<u>100.0</u>